DOCUMENT RESUME

ED 182 001 PS 010 864

AUTHOR McGillicuddy-DeLisi, Ann V.; Sigel, Irving
TITLE The Effects of Spacing and Birth Order on Problem-Solving Competence of Preschool Children. Progress Report.
INSTITUTION Educational Testing Service, Princeton, N.J.
SPONS AGENCY National Inst. of Health (DHEW), Bethesda, Md. Center for Population Research.
PUB DATE 1 Mar 79
GRANT R01-H10686-01
NOTE 79p.

EDRS PRICE MF01/PC04 Plus Postage.
DESCRIPTORS Academic Achievement: *Birth Order; Child Rearing; *Cognitive Ability; *Family Characteristics; Family Income; Interviews; Observation; Parent Attitudes; *Preschool Children; *Problem Solving; Questionnaires; Siblings; *Social Class; Task Performance
IDENTIFIERS *Birth Spacing

ABSTRACT

This study investigates the impact of family configuration and parent education-income level on parental beliefs, the relationship between these beliefs and actual parental practices, and the effect of parental practices on children's problem-solving abilities. One hundred twenty intact families participated in the study. Forty families consisted of parents and an only child aged 3 1/2 - 4 1/2 years and 80 were three-child families with a middle child aged 3 1/2 - 4 1/2 years. In the latter group, half of the families had fewer than three years' spacing between oldest and middle children and half had greater than three years' spacing. Half of the families were working class, half were middle class. Parent questionnaires and interviews and seven tasks for assessing the child's representational abilities and problem-solving competence were employed. Results implicate social class and family configuration factors in the development of children's problem-solving abilities. Children from different family configurations demonstrate different strengths and weaknesses relative to other children, depending on the problem in question. At times, the results obtained contradict common stereotypes associated with family characteristics. For instance, only children tended to generate passive strategies less often than children with siblings. Passive approaches to problems and memory abilities differentiate the three family configuration groups. (Author/RH)

Progress Report

The Effects of Spacing and Birth Order on Problem-Solving Competence of Preschool Children

R01 H10686-01

Ann V. McGillicuddy-DeLisi and Irving Sigel

Educational Testing Service
Princeton, New Jersey

Office of Population Research
National Institutes of Health

March 1, 1979

The authors wish to thank Donald Rock and Richard Harrison for lending their expertise to analysis of this data.

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Introduction

The aim of this study was to investigate the interactional relationships among parental belief systems (truth-like statements), family constellation (size, birth order spacing) and social status variables in the context of separate and collective impact on level of the child's cognitive functioning. Selection of these factors as potentially critical in influencing outcomes is based on a review of the literature and the theoretical framework provided by distancing theory (Sigel & Cocking, 1977). As will be evident in our review of previous research efforts, little attention has been directed at the interrelationships of these classes of variables.

Prior to reviewing the research literature, we wish to articulate some of the assumptions guiding this project:

1. Parents evolve belief systems regarding the nature of child development. A belief in this context is a quasi-truth statement, e.g., children learn when reinforcements are positive. These belief systems serve as processes for constructing the developing child. Consequently, we refer to these beliefs as constructs. This assertion may or may not be based on knowledge of the behavioral theory or research.

A corollary to this assumption is that parental quasi-truth statements have a high potential for change as a function of experience with children. As the children get older and parents extend and broaden their experience, the construction of the particular child and children in general may change. Constructs function as hypotheses; it is their confirmation or disconfirmation that would influence their ongoing status.

2. These belief systems form the basis for parental childrearing practices. That is, parents behave in a manner that is consistent with particular beliefs about child development and parental roles. Parental roles can be conceptualized in terms of three domains: parents as teachers, parents as managers and disciplinarians, and parents as socializing agents of norms and conventions. There is no assumption that parental beliefs must be logically consistent across these domains. That is, a parent may believe that children construct their own physical reality through abstraction from experience, but they become socialized through modelling and identification.

3. Family income and education interact with experience generated by increase in number and spacing of births to generate differences in parental beliefs and practices that ultimately impact the child's cognitive development.

In order to place this research in the context of the field of family research, a brief review of the literature investigating the relationship between family environment and children's cognitive development will be presented below.

Many studies have investigated the impact of family configuration, social class, parental attitudes and parental practices on child outcomes. For example, numerous studies have found a negative relationship between family size and children's intellectual ability (Anastasi, 1956; Dandes & Dow, 1969; Lety, 1927; Marjoribanks, Walberg & Bergen, 1975; Nisbet, 1953; Nisbet & Entwistle, 1967; Schooler, 1972; Wray, 1971; Zajonc, 1976). In these studies children from large families tended to be less successful on tests of intelligence, verbal ability or achievement.

In addition to effects for family size, several investigators have reported significant effects for birth order. Some investigators have focused on ordinal position per se (Altus, 1966; Chittenden, Foan, Zweil & Smith, 1968; Eysenck & Cookson, 1970; Schachter, 1963; Schoonover, 1959), while others have attended to birth order within given family sizes (Belmont & Marolla, 1973; Davis, Cahan & Bashi, 1976; Kellaghan & MacNamera, 1972; Zajonc, 1976; Zajonc & Markus, 1975). Reviews of the literature on birth order effects have generally concluded that this area is beset with equivocal findings (Adams, 1972; Hare & Price, 1969; Price & Hare, 1969; Schooler, 1972). While all of the studies cited above indicate that children in earlier ordinal positions tend to perform well on intellectual tests or evidence higher academic achievement than later-borns, some studies report no significant differences in intelligence with birth order (Schoonover, 1959) and a number report that second borns did better on intelligence tests than first borns (Koch, 1954; Thurstone & Jenkins, 1929; Willis, 1924).

A confluence model was proposed by Zajonc and Markus (1975) to explain the relation of family size to intelligence and which explicates the equivocal findings with respect to birth order (Zajonc, 1976). In this model, spacing between birth intervals is considered an important variable mediating the effects of family size and ordinal position on intellectual functioning. Within this model, the intellectual environment of the home is equivalent to the average of the intellectual levels of each member of the household. That is, each additional birth "dilutes" the intellectual environment to a degree, depending on the spacing between children. As

birth intervals increase, this "dilution" effects is eventually reversed. This model, in conjunction with findings reported above, would lead one to expect that only children would have the greatest advantage. This has not typically been found (Breland, 1974; Damrin, 1949; Maller, 1931; Schachter, 1963). Zajonc and Markus state that only children are at a disadvantage in the same way as last borns in that there is not a younger child in the home for them to teach.

Studies of effects of family configuration on intellectual abilities that included groups from different socioeconomic groups have generally concluded that family configuration variables interact with social status variables (Blackburn, 1947; Kellaghan & MacNamera, 1972; Kennett & Cropley, 1970; Marjoribanks, 1972; Marjoribanks, Walberg & Barges, 1975). That is, the relation between family constellation and intelligence appears to be more reliable for lower socioeconomic groups than for families of higher socioeconomic status. Research in recent years has focused on patterns and processes in home environments of families from different SES backgrounds in an effort to specify differences in linguistic behaviors, communication styles and teaching strategies that account for differences in children's intelligence with socioeconomic status (Bee, Van Egeren, Streissguth, Hyman & Leckie, 1969; Brophy, 1970; Chilman, 1965; Elder, 1962; Freeberg & Payne, 1967; Hess & Shipman, 1965; Pavenstedt, 1965; Radin, 1974; Tulkin, 1968; Walters & Stinnett, 1971). Parental behaviors, particularly the quantity and quality of verbal stimulation, have been found to be better predictors of the child's cognitive behavior than social class membership per se. Although some

studies have investigated the manner in which processes in the home vary with family configuration (Elder & Bowerman, 1963; Cicerelli, 1976; Hilton, 1967; Marjoribanks & Walberg, 1975), few studies have incorporated an evaluation of effects of family configuration and social class in combination on the quality of parent-child relations and subsequent impact of these parental practices on child outcomes.

Method

Design

The aim of this study was to assess the relation between four sets of variables: (1) family configuration, (2) parental beliefs, (3) parental childrearing practices, and (4) children's cognitive abilities. The independent variables included in this study are parental income-education level and family configuration. The major dependent variable is the child's level of problem-solving ability. However, two classes of mediating variables, which can be construed as both independent and dependent variables, are also included. The first set of mediating variables consists of measures of parental beliefs. These are dependent variables in the sense that beliefs are hypothesized to be affected by family configuration and SES. Beliefs act as independent variables in that they are conceptualized as the source of parental practices, which comprise the second set of mediating variables. These parental behaviors ultimately impact the child's cognitive development. In summary, then, the study investigates the impact of family configuration and parent education-income level on parental beliefs, the relationship between these beliefs and actual parental practices, and the effect of parental practices on children's problem-solving abilities.

Implementation of the study necessitated a research design that enabled evaluation of the influence of several familial factors on parent and child. One- and three-child families were therefore chosen to represent modern day small and large families and to provide a comparison of only children and middle children. In order to examine the effects of child-spacing, the age difference between the oldest and middle child was less than three years for half of the three-child families and was greater than three years for half of the three-child families. The three year spread was selected to represent

far spacing because the oldest and middle children, at the ages of interest in this study, are in different developmental phases of intellectual growth according to major developmental theories such as the one proposed by Piaget. In addition, half of the families in each of the three family subgroups were characterized as low income-education while the remaining families were identified as middle income-education.

Subjects

One-hundred-and-twenty intact families residing within a fifty mile radius of Princeton, New Jersey participated in the study. All of the families were volunteers who were paid $25-$40 for their participation. Volunteers were solicited through newspaper ads, public school systems, library story hours, labor unions, pediatrician offices, notices in apartment complex laundry rooms and in children's clothing and toy stores.

In accord with the research design, 40 families consisted of an only child aged 3½-4½ years and 80 were three-child families with a middle child aged 3½-4½ years. In the latter group, half of the families evidenced fewer than three years spacing between the oldest and middle children and half had greater than three years spacing between oldest and middle children. Within each of these three family structure types, half of the families were characterized as working class and half as middle class on the basis of parental educational and income levels.

In addition, an equal number of families with male target children and families with female target children were selected to comprise each family type-social class subgroup. Whenever possible, the oldest and middle child in the three-child families were the same sex. Sex of the youngest child and numbers of years spacing between the middle (target) and youngest children

in the three-child families were not considered in selection of subjects.

An attempt was also made to select families in which the target child had little or no experience in structured settings such as nursery school, daycare, play groups, etc., and in which mothers did not work outside of the home (or the father acted as caregiver while the mother worked). These factors were considered in selecting families for participation in an effort to ensure that primary adult impact on the child was from the parents and not from substitute caregivers who were not included in the data collection process.

In summary, this investigation involved study of a relatively small and specific group in depth, in order to provide a necessary chain of detailed information to increase our knowledge of processes involved in the mutual influence of parents and children. A description of the population and demographic characteristics of each group of families comprising the final sample is presented in Table 1.

Table 1

Configuration of Participant Families

Family Constellation, Socioeconomic Group and Sex of Target (Preschool) Child												
	One-Child Families				Three-Child Families with Near Spacing				Three-Child Families with Far Spacing			
	Working Class		Middle Class		Working Class		Middle Class		Working Class		Middle Class	
Demographic and Population Characteristics	Male Target Child	Female Target Child	Male Target Child	Female Target Child	Male Target Child	Female Target Child	Male Target Child	Female Target Child	Male Target Child	Female Target Child	Male Target Child	Female Target Child
Father's income: Thousands per year (Mean and S.D.)	15.00 (4.69)	13.80 (4.44)	20.60 (4.70)	19.10 (4.07)	13.30 (4.08)	18.20 (3.49)	18.50 (6.15)	20.70 (3.77)	12.90 (4.12)	16.90 (3.93)	22.80 (3.01)	21.80 (3.49)
Mother's income: Thousands per year (Mean and S.D.)	1.30 (1.64)	3.40 (3.20)	.60 (.97)	1.50 (1.58)	1.10 (1.66)	1.90 (2.69)	.20 (.63)	.60 (.97)	.40 (.84)	1.20 (2.53)	1.40 (3.13)	.20 (.63)
Family income: Thousands per year (Mean and S.D.)[a]	16.30 (4.52)	16.70 (6.31)	21.20 (4.16)	20.60 (4.38)	14.40 (3.86)	20.10 (4.58)	19.00 (6.09)	21.30 (3.20)	13.30 (4.06)	18.10 (4.41)	24.00 (4.99)	22.00 (3.74)
Father's educational level[b]	12.90 (1.29)	12.50 (1.72)	16.20 (1.14)	16.70 (1.70)	12.70 (.82)	12.70 (.95)	17.20 (1.99)	15.90 (.32)	12.50 (1.84)	13.80 (1.99)	17.20 (1.69)	17.20 (1.87)
Mother's educational level	12.20 1.23	12.40 (.97)	15.00 (1.41)	14.20 (1.75)	12.10 (.32)	12.10 (.99)	15.20 (1.62)	14.50 (1.65)	12.10 (.32)	12.60 (1.08)	15.30 (2.21)	14.70 (2.41)
Family educational level[c]	12.55 (.72)	12.45 (.86)	15.60 (.97)	15.45 (1.36)	12.40 (.39)	12.40 (.66)	16.20 (1.46)	15.20 (.82)	12.30 (.95)	13.20 (1.38)	16.25 (1.75)	15.95 (1.76)
Father's age[d] (years)	32.50 (6.43)	31.00 (4.83)	34.10 (7.14)	33.10 (5.49)	33.50 (4.38)	30.50 (3.54)	32.50 (1.58)	32.00 (3.16)	31.00 (3.50)	30.50 (2.64)	31.50 (2.42)	34.50 (2.42)
Mother's age (years)	29.50 (3.37)	28.50 (3.69)	31.00 (4.22)	30.50 (5.40)	32.00 (3.94)	27.50 (3.69)	31.00 (2.58)	31.00 (3.50)	30.50 (3.54)	29.00 (2.11)	30.50 (2.64)	33.50 (3.69)
Work hours outside home by primary caregiver (Mean and S.D.)[e]	3.50 (5.32)	9.15 (13.98)	3.80 (7.73)	12.15 (4.78)	2.00 (6.32)	2.40 (6.31)	0.00 (0.00)	1.40 (3.78)	0.00 (0.00)	6.00 (13.50)	2.00 (4.45)	1.00 (3.16)

Table 1 (Continued)

Demographic and Population Characteristics	Family Constellation, Socioeconomic Group and Sex of Target (Preschool) Child											
	One-Child Families				Three-Child Families with Near Spacing				Three-Child Families with Far Spacing			
	Working Class		Middle Class		Working Class		Middle Class		Working Class		Middle Class	
	Male Target Child	Female Target Child	Male Target Child	Female Target Child	Male Target Child	Female Target Child	Male Target Child	Female Target Child	Male Target Child	Female Target Child	Male Target Child	Female Target Child
Time spent by target child in structured settings outside home (Mean and S.D.)[f]	93.00 (128.41)	102.10 (167.70)	123.00 (106.25)	69.00 (89.50)	33.00 (104.36)	12.00 (28.98)	105.00 (104.16)	126.00 (97.78)	33.00 (104.36)	66.10 (153.14)	210.10 (140.93)	108.00 (88.54)
Target child's age in months (Mean and S.D.)	48.80 (4.37)	47.50 (2.95)	47.10 (2.42)	48.80 (1.75)	50.70 (4.88)	51.30 (2.95)	48.50 (3.69)	49.30 (3.20)	49.20 (3.71)	48.00 (4.59)	50.70 (2.98)	47.00 (2.45)
Months spacing between oldest and middle children (Mean and S.D.)	- -	- -	- -	- -	26.50 (4.97)	20.00 (6.24)	27.00 (6.36)	25.30 (5.98)	43.40 (6.75)	46.30 (6.46)	46.50 (13.74)	44.50 (11.37)
Male oldest child	-	-	-	-	9	3	10	0	8	5	8	1
Female oldest child	-	-	-	-	1	7	0	10	2	5	2	9
Oldest child's age in months (Mean and S.D.)	- -	- -	- -	- -	77.10 (4.33)	71.30 (6.02)	75.60 (7.11)	74.60 (7.57)	92.60 (8.95)	94.00 (8.19)	97.30 (13.88)	91.80 (10.63)
Months spacing between middle and youngest child (Mean and S.D.)	- -	- -	- -	- -	29.60 (9.66)	26.80 (11.21)	29.50 (11.97)	36.70 (9.88)	29.60 (11.26)	25.40 (8.29)	35.10 (8.79)	30.70 (9.24)
Male youngest child	-	-	-	-	6	4	3	8	4	6	7	4

Table 1 (Continued)

Family Constellation, Socioeconomic Group and Sex of Target (Preschool) Child												
	One-Child Families				Three-Child Families with Near Spacing				Three-Child Families with Far Spacing			
	Working Class		Middle Class		Working Class		Middle Class		Working Class		Middle Class	
Demographic and Population Characteristics	Male Target Child	Female Target Child	Male Target Child	Female Target Child	Male Target Child	Female Target Child	Male Target Child	Female Target Child	Male Target Child	Female Target Child	Male Target Child	Female Target Child
Female youngest child	-	-	-	-	4	6	7	2	6	4	3	6
Youngest child's age in months (Mean and S.D.)	-	-	-	-	20.90 (11.53)	24.50 (12.53)	19.10 (11.36)	12.60 (8.15)	19.50 (12.81)	22.60 (8.11)	15.60 (9.44)	16.60 (10.05)

[a]Family income = Father's yearly income and mother's yearly income at time of testing.

[b]Educational level = Number of years of formal schooling.

[c]Family educational level = (Number of years schooling for father + number of years schooling for mother)/2.

[d]Age of parents was indicated by checking off categories consisting of 3 year intervals; midpoint of intervals was used for this analysis.

[e]Work hours by primary caregiver excludes hours when spouse cares for child.

[f]Child's time spent in a structured setting = Hours per week x number of weeks enrolled.

Measures

Parent Questionnaires and Interviews: Parental beliefs were assessed with the Communication Belief Questionnaire and Interview Schedule (CBQI). The CBQI consists of five parts that assess (1) communication strategy preferences, (2) beliefs about child development processes, (3) beliefs concerning the impact of family constellation on the child, (4) perceived sources of childrearing beliefs, and (5) reports of changes in beliefs and practices. A brief description of the content and the administration and scoring procedures are presented separately for each portion of the CBQI in the section below.

(1) Communication strategy preferences are elicited through a questionnaire and an interview concerning responses to the questionnaire. The items comprising the questionnaire, and subsequently discussed during the interview, are 12 hypothetical situations in which a parent and preschool child interact within the context of a situational problem or critical incident. The content of the 12 situations varies from teaching the child some fact or principle to management of the child's behavior. Half of the situations involve a mother as the parent and the other half present a father in the parenting role. Within this dichotomy, half of the items involve a male child and half involve a female child. The order of presentation of the 12 situations was determined through use of a random number table (Winer, 1971, p. 881).

Each of the 12 situations is followed by five options in the questionnaire. The response options vary in the extent to which an explicit demand is made for the child's active problem-solving involvement, i e., distancing. Although response options presented in questionnaire form cannot fulfill all of the requirements of distancing behavior described by Sigel (Sigel, 1971; Sigel &

Cocking, 1977), one response option always contains the highest potential for a distancing experience for the child, followed by the four other options. These four options vary in the extent to which they fulfill the criteria for distancing.

Administration of the questionnaire consists of presentation of a booklet with instructions to rank each of the five response options for each situation from best (#1) to worst (#5) ways to handle the situation. No time limitations are imposed. Immediately upon completion of the questionnaire, the interview is administered. For each situation, the parent is first asked to state what (s)he thinks is the best way to handle the situation (Preferred strategy). The parent is told that responses not included in the questionnaire can be introduced at any time. A number of probes imed at eliciting parental rationales underlying this strategy are then elicited. Next, parents are asked to predict how they would really handle such a situation with their own child (Predicted I) and rationales are again elicited. Finally, the parent is asked to predict what they would do if their first strategy failed (Predicted II) and to provide a rationale for that response. This interview is semistructured and specific probes are available in a manual of administration and scoring procedures.

The types of strategies generated by parents are coded separately for Preferred, Predicted I, and Predicted II responses. Strategies are classified as representing one of the following eight categories: distancing, diversion, activities, passivity, rational authoritative, direct authoritative, authoritative behavior, and other. The rationales given for these strategies are coded for childrearing goals (cognitive, affective, social, personality, physical, assessment, behavioral, and nonsubstantiative), for childrearing orientation

(parent-centered, child-centered, parent-role centered, other-centered), for temporal focus (active, passive) and for constraints (parent, child, setting, other). Each aspect of the coding system and definitions of categories are presented in the Administration and Coding Manual.

(2) Beliefs about child development processes are assessed through 22 sets of probes that refer to the content of the 12 situations used to elicit communication strategies. Each set of probes consists of initial questions aimed at establishing the parent's view of the preschool child's developmental level or capabilities (e.g., "Does a four-year-old understand time?") and then follow-up questions aimed at eliciting the parent's view of developmental and learning processes (e.g., "How does the child come to understand time?"). The particular content of the probes, time concepts in this instance, is derived from issues raised in the questionnaire situations, but the focus of this set of probes is always upon the manner in which the child attains some concept or skill. A series of questions comparising the sets of probes are specified for each of the 12 situation from which their content is drawn. The probes are administered separately for each situation after preferred and predicted strategies for that situation have been discussed.

Parents' statements concerning the preschool child's capabilities relative to each set of probes are ignored in coding. That is, only responses to probes aimed at eliciting processes are scored. Forty-six constructs derived from parental responses and psychological theories of child development are used for coding. The coding procedure used is such that if no reference is made to a particular construct in one of the parent's responses, a score of 0 is assigned for that construct. Constructs that are included in the parent's verbalization, but with less frequency and intensity than other constructs,

receive a score of 1. The dominant constructs in the parent's statements are scored as 2. Definitions and examples of the 46 constructs are presented in the Manual referred to above.

(3) Parental beliefs about family constellation are assessed through questionnaire items and a brief interview. Questionnaire items are appended to the face sheet and require parents to irdicate their beliefs about ideal family size and child-spacing. Parents are also asked to provide a brief statement of their reasons for considering such a family as ideal. The interview, which occurs after communication strategies and child development constructs have been discussed, focuses on similar issues. The parent is first asked whether they think family size has an effect on the child's development, and why and how (or why not). The same questions are then asked relative to child-spacing and to ordinal position. Parents are also asked to indicate which oridnal position in which particular family constellation they would have preferred for themselves and why.

Each family structure variable is considered independently for coding purpose. Ideals stated for number of children, child-spacing and birth order are simply recorded. The effect of each family structure variable is coded according to particular aspects of the child that are affected (e.g., cognitive, social, etc.) and whether effects are positive or negative. Each type of effect mentioned by the parent is entered in checklist fashion during coding.

(4) Perceived sources of the parent's own child-rearing beliefs are assessed with a Likert-type (0-3) scale in which six variables (e.g., own upbringing, expert advice, etc.) are listed. The parents indicate how much each has affected them by checking off numbers on the scale next to each variable. Several interview probes that elicit parental descriptions of

experiences that have had a major impact on their ideas about raising a child are also administered. Parents' responses are coded according to the same Likert scale used by parents by independent scorers.

(5) The final portion of the CBQI consists of an interview in which modifications of beliefs and child-rearing practices that may have occurred with changes in family structure are discussed. Three of the 12 hypothetical situations are presented again, and the parent is asked how (s)he would respond if the target child's sibling were involved. Changes in beliefs about child development processes, in parental time of involvement with the child(ren) and reports of similarities and differences between siblings are also elicited.

Parents' responses to probes concerning communication strategies with the target child's sibling are coded according to the same eight categories used to code communication preferences and predictions for the target child. A notation is made as to whether the strategies predicted for the two children are categorically the same or different. Verbalizations concerning amount of change in child development beliefs are coded according to a Likert-type (0-3) scale. Responses to interview items pertaining to changes in parental time of involvement are coded first for changes in total amount of time spent with children as new births occurred (decreased, no change, increased), and secondly for changes in amount of time with the target child that occur with a subsequent birth. Changes in time with the target child are coded according to 4 categories: (1) Form change (e.g., interact as a group rather than as a dyad, (2) Other parent (e.g., one parent is spending less time but compensated by increase in time with other parent), (3) Substitute time (e.g., child plays with friends, siblings, more now than

previously), (4) Other. Parents discussions of similarities and differences between children in the family are coded for content (e.g., personality, cognitive, etc.) and for rationale for similarities/differences (e.g., genetics, environment, etc.).

Child Assessments: Seven tasks are used to assess the child's representational abilities and problem-solving competence. Four of these are related to knowledge of the physical world. Three of these "physical cognition" tasks are directly derived from the work of Piaget (conservation of continuous quantity, kinetic anticipatory imagery, static reproductive imagery, 1952, 1971) and the fourth is a classification task called the Object Categorization Test (Sigel, Anderson & Shapiro, 1966). The other three tasks are related to knowledge of the social world and are administered with a semiclinical interview technique. These tasks deal with the child's conception of friendship (derived from Volpe, 1976), understanding of rules and conventions and strategies in solving interpersonal problems (a modification of the PIPS, Spivak & Shure, 1974). Each of these seven tasks will be briefly described below. Specific procedures are available in the Child Assessment Administration and Scoring Manual.

Static Reproductive Imagery (SRI)

Materials: The apparatus consists of a large standing mirror, two sets of blocks that vary in shape and color, an opaque screen, and a 26" x 27" board upon which 5 rows of 7 blocks have been mounted. A stopwatch is also used.

Administration: The task consists of three phases: (1) imitation, (2) reproduction and perspective-taking, and (3) recognition. The experimenter and the child sit opposite each other at a low table for the duration of the assessment. In phase 1, the child is given one set of blocks, and is requested

to build a row of blocks that exactly matches the experimenter's row, which remains in plain view.

For phase 2, a screen is set up between the child and the experimenter. The child is asked to build a row of blocks exactly like the row that was built during phase 1. At the same time, the child is required to tell the experimenter how to build a row on the experimenter's side of the screen, so that when they are done both rows will look exactly the same. The screen is removed after the rows are completed; the child is asked to explain any discrepancies between the two rows.

For the final testing phase, all materials are removed from view, and the board displaying 5 rows of 7 blocks is presented to the child. The child is asked to point to the row that is just like the one the experimenter first constructed when the child entered the room. The child is then asked how (s)he knew which one to choose.

Scoring: For phase 1 of the task, the time in seconds that it takes the child to copy the experimenter's array of blocks is the only score given.

For phase 2, the time that elapses as the child constructs his row and instructs the experimenter is noted in seconds. The child's explanation of discrepancies between his own row of blocks and that of the experimenter is also coded. This code discriminates between children who feel they did not provide adequate descriptions of how they were building the row, those who attribute the errors to the experimenter, and those who attribute the error to some external or irrelevant source. The order in which the child places each block in the row is recorded, as is the final form of the row of blocks. These are indications of the child's strategy (beginning at left or right for example) and as success scores, respectively.

For the final phase of the assessment, the child's selection from the recognition board is recorded and coded as correct or incorrect. The reason given when asked how (s)he knew which row to choose is coded into a type of memory category (e.g., recognitory: "I knew it when I saw it" versus reconstructive: "That's the way I built it first.")

Kinetic Anticipatory Imagery (KAI)

Materials: The materials for this task consist of a clear, 14" square plexiglass board. A 2" blue square is firmly affixed to the center of the board and a 2" red square is attached to the lower right corner of the blue square by a pivot screw. Movement of a handle projecting from the red quare causes the red square to rotate, while the blue square remains stationary. A rectangular choice board with the two squares forming various configurations is also used as stimulus material.

Administration: This task consists of three phases: (1) a training phase used tc familiarize the child with the way the board works, (2) four tests of anticipation of rotation of the red square, and (3) a perspective-taking phase. The experimenter and the child sit on opposite sides of a narrow table with the plexiglass board between them for the duration of the task.

First the child receives feedback predictions of the results of two rotations. This is the training phase.

During phase two, the actual rotations stipulated by the experimenter are now performed and the child receives no feedback about his performance. The child is asked to point to the pair of squares on the choice board that represents what the squares would look like after 4 discrete rotations--90^{o}, 180^{o}, 225^{o}, 360^{o}.

Phase 3 consists of the same rotations, but with the experimenter and the child seated on opposite sides of the board. The child is asked whether she/he sees more red or more blue, and is asked to predict whether the experimenter sees more red or more blue.

Scoring: The training session is not scored. Each rotation during phase two is coded in two ways: (1) the child's selection on the choice board is used to indicate success or failure for that trial, and (2) the time in seconds taken by the child to make his/her selection. Each rotation during phase three is coded in two ways: (1) how much red or blue is seen by the child from his side of the plexiglass (to make sure the child is referring to the colors correctly, and (2) how much red and blue the child predicts the experimenter sees from the rear of the plexiglass.

Conservation of Continuous Quantity

Materials: The materials include a large flask half filled with colored water, two 500 ml. beakers and a 75 ml. cylinder.

Administration: The experimenter pours 50 mls. of liquid into one beaker and 100 mls. into the second beaker from the flask. The experimenter adjusts the level of the liquid in the second beaker until the child agrees there is the same amount to drink in both containers.

The empty cylinder is then placed in front of the child. The child is first asked to predict the liquid's level if it were to be poured from one of the beakers into the cylinder. He is then asked why the liquid would be at that level in the cylinder. The experimenter then pours the liquid from one of the beakers into the cylinder. The child is asked if his prediction was correct and why/why not. Then he is asked if there is the same amount of drink in the cylinder as there is in the beaker with 50 mls. of liquid in it, and why.

Next, the experimenter tells the child that he is going to pour the liquid from the cylinder back into the empty beaker. The child is asked to predict the level the liquid will reach in the beaker, and why. The experimenter pours the liquid back into the beaker. The child is asked if there is as much to drink in the beaker as there was in the cylinder, and why. Then he is asked if the two beakers have the same amount to drink. Then the child is asked if the two beakers had the same amount to drink when the experimenter adjusted the two liquid levels at the beginning of the testing session. Finally, the child is asked what he thinks happened to the liquid during all this time.

Scoring: The child's performance on each transformation of liquid that is performed before him(her) is coded in three ways: (1) the child's prediction of the liquid level that will be attained after the transformation is coded in milliliters; (2) the child's performance is summarized as: (a) nonconservation, (b) intermediate or (c) conservation based on answers concerning the amount "to drink" after the transformation; (3) the type of argument given for the transformation (compensation, identity, reversibility). This scoring system is based on Piaget's original conceptualization of the task (1952) and subsequent researchers who have used this task (cf. Peterson et al., 1976).

Object Categorization Task

Materials: The materials include a blue matchbook, four multicolored blocks glued together on a small platform, a white spoon, a yellow pencil, a red, blue and while metallic top, a brown and black pipe, a yellow cup, a white notebook, a bule ball, a white cigarette, a box of crayons and a metal bottle opener.

Administration: The child and the experimenter sit side by side at a table. The experimenter introduces the objects one at a time in the above order and asks the child what each object is called. The objects are placed into a 4 x 3 matrix as the child labels them.

matchbook	blocks	spoon	pencil
notebook	cup	pipe	top
ball	cigarette	crayons	bottle opener

Testing is divided into two phases: (1) the active sort, and (2) the passive sort. During phase 1, the experimenter first removes the pencil from the matrix and puts it on the table near the child. The child is asked to get all the other things that are the same or like the one the experimenter has placed aside. After the child groups the items he is asked how the objects he has chosen are the same or alike. The objects are then returned to their place in the matrix. This procedure is repeated for five other trials--the ball, then the bottle opener, the notebook, the blocks and the spoon.

The passive sort consists of four trials. The experimenter first removes all the objects from view. He then places the pipe, cigarette and matches in front of the child. The child is then asked how these items are the same or alike. These objects are removed from view. The same procedure is followed for 3 trials. Trial 2 objects are the cup, bottle opener and spoon. The notebook, pencil and crayons are used for trial 3 and trial 4 consists of the ball, the blocks and the top.

Scoring: Each response made by the child is (will be) scored for two aspects: (1) the verbal level of the response, and (2) the type of classification used.

Scorable responses on the verbal level are: (1) grouping responses and (2) nongrouping responses.

All scorable (grouping and nongrouping) responses of the child are further scored in one of the three following categories: (1) descriptive, (2) relational contextual, and (3) categorical.

Rules and Conventions

This task is a verbal interview which consists of eight items. These items vary in two ways: (1) the content of the item may refer to a physical rule or to a social convention, and (2) the item may be positive or negative (see Child Assessments Manual).

Administration: A semiclinical interview technique is used. The experimenter and the child sit in a small room and their conversation is recorded on a cassette tape. The experimenter begins each item by asking a closed question--for example, "Is it all right/OK to (do something)?" After the child responds, the experimenter asks the child "Why?" or "Why not?" Interviewers continue to probe the child's responses in order to obtain an indication of the rationales behind rules that children can generate. For example:

E: "Is it OK to each candy right before supper?	S: "No."
E: "Why not?"	S: "Because my mother told me not to."
E: "What if your mother didn't care. Would it be OK to eat candy then?"	S: "No."
E: "Why not?"	S: "Because you won't finish your supper."

After the child has given the rationales for the rule, the experimenter asks the child how he found out about this rule.

Scoring: Children's rationales for rules and responses concerning discovery of the rule is coded into one of nine categories:

D.K
Idiosyncratic
Nominal
Evaluative
Affective
Physical/perceptual
Authority-based
Normative
Rational

The Concept of Friendship

The child's understanding of the relationship of friendship is investigated through a verbal interview with the child. The four components of the friendship interview deal with (1) the child's definition of friendship, (2) the child's description of friendships, (3) the child's rationale for friendships, and (4) the stability of friendship as a mutual relationship over a variety of situations.

Administration: The experimenter and the child sit in a small room and their conversation is recorded. A total of 15 items comprise all four components of the interview. Each item is first phrased as a general question. If the child does not respond, the experimenter rephrases the question in terms of a concrete situation, eliciting the name of one of the child's friends.

Scoring: Children's definitions, descriptions and rationales for friendships are coded into nine categories. These categories are derived from the work of Volpe and Youniss (1976). These categories are defined as:

D.K./no answer
Idiosyncratic
Nominal
Physical/perceptual
Affective
Personality attribute
Interactive
Reciprocity of relationship/shared needs
Behavioral

Children's statements about the stability of the relationship are coded as to whether the relationship would: (1) continue unchanged, (2) be terminated, (3) variable (change as a result of situation, but not necessarily be terminated).

Lastly, the child's rationale for the continuation, termination, or change in the relationship is coded according to: (1) appropriate rationale,

(2) inappropriate rationale, (3) no rationale given.

Interpersonal Problem-solving

Materials: This task is a modification of the PIPS (Spivak & Shure, 1974). The interpersonal problem-solving task differs from the PIPS in that the former involves actual props to represent the content of each item, rather than pictures. In addition, all of the PIPS items involve a conflict over some object. The interpersonal problem solving task adapted from the PIPS includes items wherein one child must teach another some game or rule. These modifications serve two purposes. First, children do not have to verbalize in order to indicate their problem-solving strategy. They can simply show the tester their solution to the problem by acting it out with the props provided. Second, a measure of interpersonal problem-solving strategies is possible across two content areas, when there is a conflict over some object and when another child must be taught something in order to participate.

The stimuli used for this task include three dolls, a miniature tray of cookies, a miniature slide, a puppet that fits the doll's hand, a small ball, and a miniature table and chair.

Administration: The eight situations included in this interview are presented with dolls acting out each situation. One doll represents the subject and one doll the "other." The experimenter and the child sit side by side at a table and the task is recorded on a cassette tape recorder.

For the four situations involving a conflict over the object, the child is asked what he would do to resolve the conflict (e.g., "Get a chance to play with the ball"). Then the child is asked how the friend would feel and what the friend would do in response. The child is then asked what he would try next if his first response didn't work. The child may respond to any of

those questions verbally or by acting out with the dolls. Whenever the child demonstrates a strategy in the latter manner, the tester describes the action aloud so that it is recorded on tape.

The other four situations require the "child" to teach the "friend" some game or social skill. The child is asked what he could do so the game could be played. Then he is asked whether the "friend" would know how to perform the activity after the child tried his(her) idea. The child is also asked what he would try next if his(her) first strategy failed.

Scoring: The child's strategies for solving the interpersonal situations are coded into one of 7 categories. These categories are:

Idiosyncratic	Aggression
Engagement	Participation
Telling	Substitute Goal
	Authority Intervention

The child's anticipation of the effectiveness of his strategy is coded such that:

D.K.
Effective
Not effective
Inappropriate or unclear

Since administration of these tasks requires almost an hour, which would be excessive for a 3½-4½ year old child, the seven assessments were divided into two groups that were given at different times. Group I tasks included the conservation, interpersonal problem-solving, static reproductive imagery and friendship tasks. Group II assessments were the rules and conventions, kinetic anticipatory imagery and categorization sorting tasks.

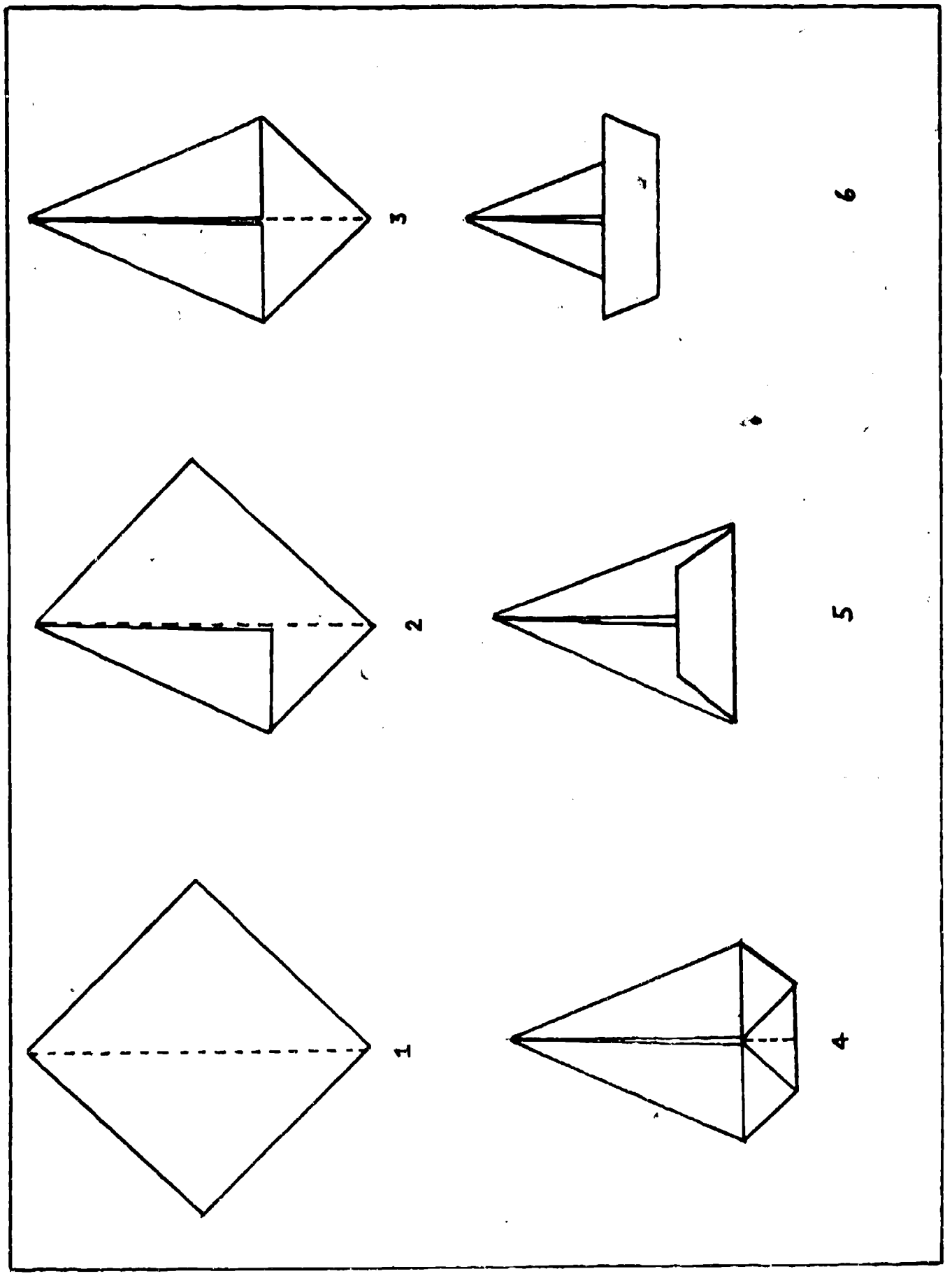
Parent-Child Observations: Each parent performed two tasks with each child included in the study. One task was a storytelling task and the other task was an origami (paper-folding) task.

Materials: The materials for the storytelling tasks used in this study were edited versions of popular children's books. Each book had a comparable theme which involved all the possible ways some object could be used. The stories were edited to eliminate sex bias and to attain approximate equal length between the story the mother would read and the one the father would read. A total of four stories were used, one for each parent to use with preschool children and one for each parent to use with the oldest child in multiple-child families. The stories for the 3 to 4-year-old children and the ones for the older children were selected with their age levels in mind. The stories used with preschool children were edited versions of Hello Rock by Roger Bradfield and A Rainbow of My Own by Don Freeman. The oldest sibling's stories were edited versions of A Big Ball of String by Marion Holland, and Christina Katerina and the Box by Patricia Lee Gauch.

The materials for the paper-folding tasks involved a 40" x 30" rectangular board. Each step of the folding process was represented on this board by an actual piece of 8½" x 8½" white paper folded in the appropriate manner (see Figure 1). Each step was presented in sequence and each step was numbered. This procedure was adapted from the work of Croft et al. (1976). A stack of 8½" x 8½" paper was also provided. A total of four paper-folding tasks was also used, one for each parent to use with each child included in the study. Preschool children constructed a boat with one parent and a plane with the other parent. These two tasks were equated for difficulty and length. That is, each task had the same number of steps and the same number of horizontal

Figure 1

Diagram of Paper Folding Task Display Board



and vertical versus diagonal folds. Oldest siblings performed on tasks involving a bird and a whale. These two tasks were also equated for difficulty and length. All paper-folding tasks were adapted versions of those presented in Origami by Harry Helfman. The order of administration of tasks was counterbalanced for story-paper, oldest-preschool child and mother-father pairs within and between families.

These two tasks were selected on the basis of the extent to which they demand teaching on the part of the parents and the extent to which the task is structured. The paper-folding task has inherent structure in that a number of specific steps are presented to the parent-child dyad. In addition, a specific product, the boat for example, is specified, which makes a clearer demand on the parent to teach the child something. The storytelling task, on the other hand, has less structure and teaching demands inherent in the task. With two such tasks a comparison of parental strategies across two different types of situations was possible.

Administration: The parent is seated at a low table facing a one-way mirror. If the storytelling task was administered first, the book was placed on the table. If the paper-folding task was administered first, the stack of paper was placed on the table to the upper left of the parent and the display board of the task placed on an easel in front of, and a little to the left of the parent. Instructions for the appropriate task were then read to the parent. The instructions are essentially the same for observations with both preschool and older children, but the child's name and age are included in the instructions. The child is then brought to the room, sits to the right of the parent behind the table, and the door is closed as the experimenter exits. After the first task is completed, the child and the materials for the first

task are taken out of the room. The experimenter brings the materials for the second task into the room, reads the instructions for that task and then the child returns. Thus, the second task is administered immediately upon completion of the first task.

In addition to the materials needed to complete each task, a toy telephone is placed on the table in the upper-right corner. We decided to include the telephone as a prop to distract the child, in order to obtain spontaneous measures of parental management and structuring of the task when a child becomes distracted. A telephone was chosen because it is relatively unloaded with respect to sex bias as a plaything and most preschool children are immediately drawn to it.

Coding: Each parent-child interaction is coded separately, yielding two sets of scores for each dyad--one for the structured teaching (origami) task and one for the semistructured (story) task. In accord with the hypotheses of the study, the coding system focuses primarily on parental utterances and nonverbal behaviors, although some aspects of the child's behaviors are included in the coding categories. Those aspects that deal with child behaviors are (1) degree of engagement in the interaction (e.g., the child is actively engaged in the interaction, or is actively engaged in some other activity, or is passively engaged in the interaction such as listening to the parent or is passively nonengaged in any activity), (2) evaluations of the child's success in completing each step of the origami task, and (3) points at which the child is the initiator and parental behaviors are responses rather than vice versa.

Five aspects of parental behaviors are coded: (1) teaching/management demands placed upon the child, (2) verbal emotional support systems, (3)

nonverbal parental behaviors that serve task facilitation or as emotional support systems, (4) form of utterances, and (5) cohesion of the interaction. For coding purpose, the unit of interaction is one utterance and all five aspects listed above are considered for each coding unit. Many variables comprise each of the five aspects and these are defined in the Parent-Child Interaction (PCI) Manual. Several examples of variables that are included in this coding system are presented in Table 2.

Procedures

Data collection required two contact sessions with each family at the Educational Testing Service Research Laboratory. Families had the option of coming together as a family for both sessions or having the mother come with the children for one session and the father come with the children for the other session. Once the selected family made this decision, the family was assigned to one of 12 schedules that serve to balance the order of task administration both within and between families.

For those families (n=80) who chose to have parents come separately to the two contact sessions, half of the mothers and half of the fathers were scheduled for the first contact session. Within this dichotomy, half of the parents were administered the interview first and the observational tasks second, and the other half performed these tasks in the reverse order. In addition, half the parents in each group were administered the observational tasks in the order story-origami and half in the order origami-story and half the children were assessed on Group I assessments and half on Group II assessments during the first session.

Families who chose to come together (n=40) for both contact sessions were assigned to similar schedules, but the interview was administered to

Table 2

Examples of Parent-Child Interaction Variables Coded with PCI

Aspect of the Interaction	Variables
Teaching/Management Demands	Mental operational demands placed on the child by the parent to propose alternatives, describe, evaluate consequences, etc. (teaching) or power assertion, persuasion, structuring tasks, etc. by the parent (management)
Verbal Emotional Support System	Approval, Disapproval, Approval with task facilitation, Qualified approval, Correction, Informational feedback, Reflection, Disapproval with task facilitation, Qualified disapproval, Informational feedback with elaboration evidenced by parent
Nonverbal Emotional Support System	Demonstration of positive physical affect, Demonstration of negative physical affect, Helping behavior, Takeover by parent
Form of Parental Utterances	Statement, Imperative, Fragment, Convergent question, Divergent question
Cohesion	Orient, Redirect, Divert, Out of contact, No time for child to respond
Child Engagement	Actively engaged with parent, Actively nonengaged with parent, Passively engaged with parent, Passively nonengaged
Child Performance	Total failure, Many mistakes and/or much physical parental assistance, Completed with few mistakes and some assistance, Correctly completed
Time	Total time from child entering room to task completion or 30 minutes

one parent and the observational tasks to the other parent in each session. For example, half of these families were scheduled so that the mothers were interviewed while the fathers were observed interacting with the child(ren) during the first session and in the other half the fathers were interviewed and the mothers observed in the first session. During the second visit each parent was administered the task their spouse had performed in the prior visit. Order of observational tasks (origami-story, story-origami) and child assessments was varied systematically in the same manner as for families in which each parent came separately.

In addition to these stringent controls for order of task administration between families, tasks were balanced within each family. Thus, for each family, if the mother performed the story task and then the origami task in the observations, the father was administered the counterpart tasks in the reverse order. (Note that there were 2 story tasks and 2 origami tasks for each child so that the task was new for both parent and child.) Within each family, one parent was administered the interview before the observational tasks and the other parent performed the tasks in the reverse order. In multiple child families, the target child was assessed before the older sibling in one session and the order reversed for the other session.

Mothers and fathers were each administered the questionnaires and interviews individually by two of four independent female interviewers. The parent questionnaires and interviews took 2-3 hours to complete and all interviews were recorded on cassette tapes. Evaluation of children's problem-solving abilities was conducted in two 20-30 minute sessions less than three weeks apart by two of four independent research assessors. Children's responses were also recorded on cassette tapes. Parent-child interactions were video-

taped through a one-way mirror by the research assistant assigned to assess the children in each particular session. Thus, four independent data collectors came into contact with each family--one for each parent interview and two for the child assessments administered to each family.

Parent interviews were coded by three independent scorers, child assessments were coded by two other scorers and the parent-child observations were coded by six independent coders. Six coders were necessary for scoring observations as the coding system is quite complex and a total of 800 parent-child observations were collected (2 parents x 120 target children x 2 tasks + 2 parents x 80 older siblings x 2 tasks).

Estimates of reliability and validity of the parent interviews and child assessments, and agreement between observational data coders have been computed at different points of the coding process. Report of these efforts are available in a published paper describing the project (McGillicuddy-DeLisi, Sigel, & Johnson, 1979) and in the 1977 Progress Report to NIH.

Results and Discussion

In the first level of analyses, correlational techniques were employed in order to base data reduction on empirical results as well as theoretical grounds. Both composite and discrete measures were included in the subsequent analyses which are presented in this section. The final set of variables included as measures of children's cognitive abilities, of parental beliefs and of parental practices will therefore be briefly described at the beginning of each section dealing with these three areas of measurement.

Child Assessments

One aim of this research was to broaden the evaluation of cognitive functioning to include specific content domains that may be differentially affected by particular family configurations. The basic cognitive processes of intellectual functioning have typically been ignored while global IQ measures have been emphasized. Particular strengths and weaknesses in particular problem-solving situations that are associated with the child's position in the family constellation have been given minimal attention in prior research. On the assumption that the cognitive environment provided in the home varies in a systematic manner within different family configurations, and this environment affects particular aspects of development, it is important to investigate classes of intellectual variables that form the substrate upon which IQ tests are built.

In order to determine which variables would differentiate the three family constellation groups from one another, a step-wise discriminant

analysis was computed on the 26 variables forming the final child assesment data set. Two significant functions, summarized in Table 3 were obtained. For the sake of brevity, only those variables used to define the functions will be described. The standardized canonical discriminant function coefficients exceeded .50 for three variables on the first function. One variable consisted of frequencies of passive interpersonal strategies (e.g., wait, withdraw, substitute goal) in the interpersonal problem-solving task; one consisted of frequency of classifying items on the basis of surface features (form, color, structural) in the categorization task; and one consisted of the frequency of correct pairs of blocks on the static reproductive imagery (memory) task. The latter variable loaded in the oppostie direction from the prior two variables. The function is interpreted as representing a passive approach to social and cognitive problems. The group centroic (mean) for only children was lower than that for children in the three-child family groups on this function, indicating that only children differed from the others in their less passive approach to problems.

The second function consisted of time in seconds children used to reconstruct an array from memory and success on a recognition task. Hence, the groups can be differentiated from one another in terms of memory performance. Of the 26 variables included in this analysis, these variables are the most closely related to items used to assess IQ. The pattern of group centroids for this function resembles findings relating family constellation to IQ and is consistent with the confluence model. That is, children from families with far child spacing exhibit higher memory scores than those from families with near spacing. The performance of only children is intermediate when compared to the other groups.

Table 3

Summary of Discriminant Analysis Results of Differences Between Children from Three Family Constellation Groups on Selected Child Assessment Variables

Function	Eigenvalue	Percent of Variance	Canonical Correlation	Wilks Lambda	Chi-Squares	D.F.	Significance
1	.25	62.65	.45	.70	40.97	18	.002
2	.15	37.35	.36	.87	15.72	8	.05

Standardized Canonical Discriminant Function Coefficients

	Function 1	Function 2
1. Correct predictions: Conservation task	.31	.40
2. Grouping based on descriptive characteristics: Categorization task	.57	-.03
3. Maintenance of anchor point: Kinetic anticipatory imagery task	-.29	-.29
4. Time to reconstruct array from memory: Static reproductive imagery task	.35	-.72
5. Tower building: Static reproductive imagery task	-.36	.16
6. Correct sequence pairs: Static reproductive imagery task	-.51	-.10
7. Correct recognition of array: Static reproductive imagery task	.11	-.49
8. Lower level definition of friendship: Friendship interview	-.40	-.29
9. Passive strategies: Interpersonal problem solving task	.61	.01

Canonical Discriminants Functions Evaluated at Group Centroids

Group	Function 1	Function 2
Near child spacing	.38	.45
Far child spacing	.32	-.49
Only child	-.70	.02

In summary, the three family configuration groups can be differentiated from one another in terms of two classes of variables, i.e., passive approaches to problems and memory abilities. The pattern of differences between groups varies with the particular cognitive content measured.

Since many studies have indicated that SES interacts with family constellation in affecting child outcomes, discriminant analyses were computed on the six groups formed by the SES and family constellation factors (n = 40 for each group) in order to investigate which variables differentiate such groups. Three functions, summarized in Table 4 were obtained. The first function consisted of maintenance of anchor points in a spatial transformation task (KAI) in a negative direction and correct predictions of transformations (conservation) in a positive direction. This function therefore represents anticipation of changes accompanying transformations. Children from middle class, only-child families and from working class, far-spacing families produced lower group centroids on this function, while working class children with near-spacing between siblings and middle class children from far-spacing families had higher group centroids on this function.

The second function was largely due to knowledge of rationales underlying rules and conventions. Children from working class, far spacing families had the lowest group centroid on this function while middle class, near spacing families tended to give higher level rules and conventions responses. In general, children from middle class families evidenced greater knowledge of rules than children from working class families.

Table 4

Summary of Discriminant Analysis Results of Differences Between Children from Six Family Constellation-SES Groups on Selected Child Assessment Variables

Function	Eigenvalue	Percent of Variance	Canonical Correlation	Wilks Lambda	Chi-Squares	D.F.	Significance
1	.34	29.96	.51	.36	111.89	65	.000
2	.30	26.25	.48	.48	79.44	48	.003
3	.26	22.56	.45	.63	50.52	33	.03

Standardized Canonical Discriminant Function Coefficients

	Function 1	Function 2	Function 3
1. Correct predictions: Conservation task	.61	.34	.11
2. Grouping based on logical classes: Categorization task	.34	.11	-.38
3. Grouping based on descriptive characteristics: Categorization task	.45	-.03	.25
4. Correct anticipation of rotation outcome: Kinetic anticipatory imagery task	.09	.11	.03
5. Maintenance of anchor point: Kinetic anticipatory imagery task	-.71	.07	.15
6. Time to reconstruct array from memory: Static reproductive imagery task	-.11	-.56	.27
7. Tower building: Static reproductive imagery task	-.22	-.04	-.34
8. Correct sequence pairs: Static reproductive imagery task	-.01	.26	-.46
9. Correct recognition of array: Static reproductive imagery task	.32	.08	-.02
10. Lower level definition of friendship: Friendship interview	-.23	-.07	-.41
11. Higher level relational definition of friendship: Friendship interview	-.44	.19	.04
12. Passive strategies: Interpersonal problem solving task	.14	-.16	.64
13. Higher level (logical) rationales for rules and conventions: Rules and conventions task	-.31	.63	.41

Canonical Discriminant Functions Evaluated at Group Centroids

Group	Function 1	Function 2	Function 3
Working class: Near child spacing	.83	-.30	.06
Middle class: Near child spacing	-.18	.67	.56
Working class: Far child spacing	-.57	-.94	.43
Middle class: Far child spacing	.65	.24	.15
Working class: Only child	-.02	-.14	-.95
Middle class: Only child	-.71	.47	-.25

The third function represents knowledge of social relationships, as indicated by high canonical coefficients for definitions of friendship, passive interpersonal problem-solving strategies and arguments underlying rules and conventions. Only children, especially those from working class families, evidenced lower centroid scores than children forming the other groups. Children from middle class families with near spacing and from working class families with far spacing, appeared at the upper end of this function.

The patterns of variables that comprise the functions differentiating the groups included in these discriminant analyses support our previous hypotheses that family environment factors interact in a complex manner to affect different aspects of children's development. For instance; working class only children may differ from children in large families in their knowledge of social relationships, but these children as a group do not evidence lesser knowledge of rationales for rules and conventions or for ability to predict transformations/movements in space. Thus, it cannot be concluded that one particular family constellation provides an advantage over the others. Effects appear to vary, and some are positive, and some negative, relative to other types of families. Furthermore, the pattern of variables differentiating the groups based on configuration (three groups) did not account for a large amount of the total variable and were not as helpful as the analyses based on the six configuration--SES groups, In fact, univariate ANOVA's [constellation (3) x SES (2) x sex of child (2)] and inspection of mean scores for each group indicated that most family constellation effects were subsumed by intearctions of

family constellation with either SES or sex of child (see Table 5). As a result, analyses of parent measures and subsequent analyses of child assessments in relation to parent measures were selected with these interaction effects in mind.

Parent Interviews

Parental communication strategy variables were also collapsed on the basis of correlations between variables and theoretical considerations. For example, the distinction between "Preferred" and "Predicted I" strategies presented in the Method section of this report was not maintained since correlations between strategies elicited for these two conditions exceeded .80. This was not surprising, since it is logical that most parents would predict they would use the strategy that they prefer. Strategies predicted for handling situations in which an initial strategy failed (i.e., "Predicted II strategies") did not correlate significantly with stated "Preferred" or "Predicted I" strategies and were therefore treated as a separate set of variables. The final data set pertaining to communication strategies therefore consisted of frequencies with which each of the nine types of communication strategies were generated as "Preferred" and as "Predicted II" over the 12 interview situations. The variables representing parental childrearing goals, childrearing orientation, temporal focus, and situational constraints were also coded for each of the 12 interview items. Eight types of goals (cognitive, physical, personal-social, etc.), four types of orientations (child, parent, parent-role, other), frequency of an active temporal focus, and four types of constraints (child, parent, setting, other) were coded for each interview item, yielding a total of 35 variables representing parental communication strategy beliefs.

Child Assessment Variables	Family Constellation, Social Class and Sex of Child																				
	One-Child Family							Three-Child Family with Near Spacing							Three Child Family with Far Spacing						
	Working Class			Middle Class				Working Class			Middle Class				Working Class			Middle Class			
	Females	Males	Total Working Class	Females	Males	Total Middle Class	Total Only Child	Females	Males	Total Working Class	Females	Males	Total Middle Class	Total Near Spacing	Females	Males	Total Working Class	Females	Males	Total Middle Class	Total Far Spacing
Frequency of correct predictions: Conservation task	.80 (.63)	.90 (.88)	.85 (.75)	.90 (.57)	1.00 (.82)	.95 (.69)	.90 (.71)	1.50 (.53)	.90 (.74)	1.20 (.70)	1.10 (.57)	.90 (.57)	1.00 (.56)	1.10 (.63)	.50 (.53)	.60 (.52)	.55 (.51)	1.20 (.63)	1.00 (.67)	1.10 (.64)	.8 (.6
Frequency of logical grouping: Categorization task	2.60 (1.96)	3.40 (2.84)	3.00 (2.41)	4.10 (3.38)	3.80 (1.87)	3.95 (2.67)	3.48 (2.55)	5.20 (2.35)	2.40 (2.07)	3.80 (2.59)	5.60 (2.80)	3.40 (2.46)	4.50 (2.80)	4.15 (2.69)	3.80 (2.25)	3.40 (1.96)	3.60 (2.06)	4.50 (3.24)	4.90 (2.38)	4.70 (2.77)	4.1 (2.3
Frequency of groupings based on descriptive characteristics: Categorization task	3.50 (3.78)	2.40 (2.12)	2.95 (3.03)	3.20 (3.80)	3.10 (3.96)	3.15 (3.77)	3.05 (3.38)	4.30 (3.50)	2.10 (2.73)	3.20 (3.25)	5.30 (4.08)	5.80 (3.65)	5.55 (3.78)	4.38 (3.68)	4.70 (2.79)	3.00 (3.37)	3.85 (3.13)	3.80 (3.62)	6.90 (2.77)	5.35 (3.51)	4.6 (3.5
Frequency of maintaining correct anchor point: Kinetic anticipatory imagery task	2.90 (.58)	2.40 (1.17)	2.65 (1.04)	3.20 (.79)	3.60 (.52)	3.40 (.68)	3.03 (.95)	2.60 (1.58)	2.20 (1.14)	2.40 (1.35)	3.60 (.52)	2.30 (1.34)	2.95 (1.19)	2.68 (1.29)	2.80 (.80)	2.90 (1.10)	2.85 (.93)	3.20 (.92)	2.60 (1.27)	2.90 (1.12)	2.8 (1.0
Time in seconds to reconstruct an array: Static reproductive imagery (memory) task	137.70 (77.49)	111.10 (79.28)	124.40 (77.51)	117.20 (59.83)	80.40 (37.86)	98.80 (52.26)	111.60 (66.52)	99.70 (50.74)	139.30 (83.31)	119.50 (59.42)	113.60 (59.19)	92.10 (50.87)	102.85 (54.84)	111.18 (57.06)	243.10 (272.97)	177.40 (53.06)	210.25 (194.33)	139.30 (75.19)	123.60 (61.90)	131.45 (67.51)	170.8 (149.0
Tower building: Static reproductive imagery (memory) task	.20 (.42)	.10 (.32)	.15 (.37)	.20 (.42)	0.00 (0.00)	.10 (.31)	.13 (.34)	.10 (.32)	0.00 (0.00)	.05 (.22)	.10 (.32)	.10 (.32)	.10 (.31)	.08 (.27)	.20 (.42)	0.00 (0.00)	.10 (.31)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	.0 (.2
Frequency of passive strategies: Interpersonal problem-solving task	.40 (.52)	.20 (.42)	.30 (.47)	1.00 (1.05)	.90 (.99)	.95 (1.00)	.63 (.84)	1.80 (1.23)	.70 (.82)	1.25 (1.16)	.80 (1.14)	1.40 (1.90)	1.10 (1.55)	1.18 (1.36)	1.40 (1.17)	1.10 (1.37)	1.25 (1.25)	1.20 (1.23)	1.20 (1.40)	1.20 (1.28)	1.2 (1.2
Frequency of engaging strategies: Interpersonal problem-solving task	3.50 (2.12)	2.80 (1.75)	3.15 (1.93)	4.00 (1.33)	3.20 (1.69)	3.60 (1.54)	3.38 (1.74)	2.70 (1.89)	2.90 (1.85)	2.80 (1.82)	4.60 (1.43)	2.60 (1.96)	3.60 (1.96)	3.20 (1.91)	3.60 (1.96)	2.30 (1.64)	2.95 (1.88)	3.80 (1.75)	3.60 (2.37)	3.70 (2.03)	3.3 (1.9
Frequency of predicted effectiveness of strategy: Interpersonal problem-solving task	5.00 (2.49)	4.50 (1.90)	4.75 (2.17)	6.40 (.84)	4.90 (2.28)	5.65 (1.84)	5.20 (2.04)	4.90 (1.52)	3.50 (1.78)	4.20 (1.77)	6.00 (2.16)	4.20 (1.99)	5.10 (2.22)	4.65 (2.03)	4.90 (2.23)	5.00 (2.00)	4.95 (2.06)	5.10 (1.97)	5.60 (1.51)	5.35 (1.73)	5.1 (1.8
Frequency of responses consistent with societal rules and conventions: Rules and conventions task	6.60 (1.65)	6.40 (1.43)	6.50 (1.50)	7.50 (1.27)	6.70 (1.83)	7.10 (1.59)	6.80 (1.56)	5.50 (2.12)	6.70 (1.25)	6.10 (1.80)	7.70 (.68)	7.20 (.92)	7.45 (.83)	6.78 (1.54)	6.30 (1.95)	6.50 (1.43)	6.40 (1.67)	6.90 (.88)	7.20 (1.40)	7.05 (1.15)	6.7 (1.4
Frequency of statement of a rationale underlying rules and conventions: Rules and conventions task	2.37 (1.95)	2.00 (2.36)	2.18 (2.11)	4.10 (2.89)	3.03 (2.36)	3.57 (2.62)	2.88 (2.45)	2.16 (2.12)	1.80 (1.62)	1.98 (1.84)	5.27 (1.84)	3.80 (1.14)	4.53 (1.67)	3.26 (2.16)	3.00 (2.11)	2.37 (2.44)	2.68 (2.24)	2.60 (1.43)	3.60 (2.46)	3.10 (2.02)	2.8 (2.1

Discriminant analyses were conducted for the family constellation groups in order to determine the variables which could differentiate these three groups from each other. The analysis, summarized in Table 6, yielded one significant function. Inspection of group centroids indicated that parents of three-child families with near child spacing differed from parents of only children and parents with far child spacing. This finding is consistent with interpretations of the Zajonic and Markus confluence model that posits birth intervals as a critical feature determining the relationship between family constellation and intellectual environments provided in the home. That is, parents in families with shorter intervals between births can be differentiated from parents in other family constellations in terms of communication strategy beliefs. Theoretical predictions that these differences lead to alternative child-rearing practices and differential child outcomes will be tested in subsequent analyses that include observational and child assessment data.

The standardized canonical coefficients indicate that this function represents directness on the part of the parent. That is, parents with near-child spacing preferred direct authoritative strategies, evidenced childrearing orientations toward others rather than the target child or self, and discussed constraints on the child. Predicted II strategies of diversion and goals of assessment of the child's inner state or level of competence loaded in the opposite direction on this function. In summary, parents of closely-spaced children espoused a direct and expedient approach to the problem given their perceptions of constraints on the child, and an orientation toward others (e.g., playmates, sibs) in the child's environment.

Table 6

Summary of Discriminant Analysis Results of Differences Between Parents from Three Family Constellation Groups on Selected Communication Strategy Beliefs Variables

Function	Eigenvalue	Percent of Variance	Canonical Correlation	Wilks Lambda	Chi-Squares	D.F.	Significance
1	.21	68.23	.41	.75	64.703	30	.000

Standardized Canonical Discriminant Function Coefficients

	Function 1	Function 2
1. Distancing PF (preferred strategy)	-.36	-.42
2. Distancing PII (predicted follow-up strategy)	-.48	-.06
3. Direct authoritative PF	-.41	.03
4. Diversion PII	.42	.35
5. Authoritarian behavior PF	-.31	-.12
6. Passivity PII	-.21	.34
7. Other strategies PF	-.09	-.46
8. Cognitive goals	.32	.27
9. Personality goals	-.08	.48
10. Assessment goals	.51	-.07
11. Behavioral goals	-.19	.29
12. Parent orientation	.23	-.27
13. Other orientation	-.43	-.40
14. Child constraints	-.47	.21
15. Other constraints	.32	-.11

Canonical Discriminant Functions Evaluated at Group Centroids

Group	Function 1	Function 2
Near child spacing	-.64	.01
Far child spacing	.30	-.39
Only child	.34	.37

It was hypothesized at the outset of this study that parental income-education level would interact with number and spacing of children in determining parental beliefs. This hypothesis, in conjunction with the findings that performance on the dependent variables (child assessments) varied with SES and family constellation, suggested that a discriminant analysis based on the six groups formed by family constellation-SES groups (n=40) for each group) might clarify the differences in beliefs espoused by such groups. The analysis yielded three significant functions that are summaried in Table 7. The first function represents parental concern with abilities of the child and emphasis on socialization. Parents of middle class, near spacing families and of working class, far spacing families were the most disparate groups on this function. The latter group was evaluated positively on the function.

The second function represents a nondirective expedient approach to childrearing. Parents tend to be self-oriented, prefer to divert the child to a nonconflict situation if their first strategy failed, and do not espouse direct authoritative techniques. On this function, middle- and working-class, near spaced families fall very close to one another and middle- and working-class, far spaced families appear similar to one another. That is, multiple-child families appear to be differentiated on the basis of child spacing but not SES on this function. The pattern for parents of only children was somewhat different, however. The centroids for middle class parents of only children were much higher than that of working class parents of only children for this function. In summary, parents with near child spacing appear to differ from parents with far child spacing on variables representing a nondirective and expedient childrearing approach, regardless of SES membership. For the only child

Table 7

Summary of Discriminant Analysis Results of Differences Between Parents from Six Family Constellation-SES Groups on Selected Communication Strategy Beliefs Variables

Function	Eigenvalue	Percent of Variance	Canonical Correlation	Wilks Lambda	Chi Squares	D.F.	Significance
1	.32	37.45	.49	.46	175.96	85	.000
2	.22	25.45	.42	.61	112.86	64	.000
3	.15	17.92	.36	.74	68.132	45	.01

Standardized Canonical Discriminant Function Coefficients

	Function 1	Function 2	Function 3
1. Distancing PF (preferred strategy)	-.40	-.07	.52
2. Distancing PII (predicted follow-up strategy)	-.46	-.32	.02
3. Direct authoritative PF	-.19	-.43	-.59
4. Diversion PII	.04	.41	-.19
5. Passivity PII	.12	-.32	.10
6. Other strategies PF	.15	.06	.14
7. Cognitive goals	.39	.03	-.54
8. Affective goals	-.25	.13	-.40
9. Local goals	.50	.02	-.35
10. Assessment goals	.58	.44	-.34
11. Child orientation	-.40	.08	-.52
12. Parent orientation	-.06	.41	-.27
13. Other orientation	-.25	-.40	-.30
14. Child constraints	-.07	-.38	.67
15. Setting constraints	-.45	.01	.21

Canonical Discriminant Functions Evaluated at Group Centroids

Group	Function 1	Function 2	Function 3
Working class: Near child spacing	.30	-.56	-.29
Middle class: Near child spacing	-.81	-.47	.51
Working class: Far child spacing	.80	.28	.39
Middle class: Far child spacing	-.48	.29	-.60
Working class: Only child	.45	-.26	-.15
Middle class: Only child	-.25	.71	.14

families, however, middle class parents differed from working class parents on this function. Group centroids were higher for middle-class parents of only children than for any of the other five SES-family constellation groups.

The third function, comprised of child constraints and distancing strategies in one direction, and direct authoritative strategies, cognitive goals and child orientation in the other direction, has been interpreted as representing parental preferences for nondirective communication strategies aimed at the child's level of competence. Working- and middle-class parents of only children did not appear different from one another on the basis of group centroids for this function. However, parents forming the middle class, far spacing and the working class, near spacing groups were on the lower end of this function while middle class, near spacing and working class, far spacing groups had higher group centroids for this function. That is, the latter two groups, working class, far spacing and middle class, near spacing can be differentiated from the other groups on the basis of beliefs in nondirective strategies and concern with the child's limitations and capabilities.

In summary, discreiminant analyses have provided a description of communication strategy belief variables which can differentiate between the groups of interest in this study. The relationship between family configuration, socioeconomic variables and parental childrearing beliefs is clearly not a simple linear relationship that is easily investigated. The results of these analyses clearly show that groups based on family size, child spacing and parent income-educationare differentiated in one manner for a specific subset of childrearing beliefs. However, for a

different constellation of variables the differences between groups are modified. Subsequent analyses focusing on the relationships between communication beliefs and behavior outcomes will be used to clarify the nature of the impact of such differences on parent behaviors and children's problem-solving abilities.

Relationship Between Parental Communication Beliefs and Child Assessments

Interaction effects for social class and family configuration variables were evident for both child assessments and parental communication beliefs (see preceding sections). In order to avoid misinterpretations of the relationship between parental beliefs and children's performance on the problem-solving tasks due to these interaction effects, an analysis of covariance was conducted. In applying the general linear model to these data, the first task was to investigate the extent to which socioeconomic status and family configuration correlated with the child assessments (dependent variables). Such tests for covariates involve testing main effects separately in an equation that includes the mean of the dependent variables over all observations and testing the interaction of the covariates, with the interaction as an added term in the equation.

Specifically, the analysis required that correlations between each of the covariate terms and its associated dependent variable be obtained for each of the 16 child assessment variables that were selected on the basis of prior analyses. Corresponding F-tests for significance of the explained variance for each term were also computed. Specified contrast coefficients were used to further break down the analysis for the family configuration covariate to compare the three groups (only child; near spacing; far spacing). For example, two independent contrasts are possible for the three family

configuration groups at any one time. The coefficients for each pair of contrasts were chosen so that resulting effects could be interpreted and tested separately for significance. This was done for the following three pairs of contrasts: (1) only-child group versus near-spacing group; mean of combined only-child and near-spacing groups versus far-spacing group, (2) mean of combined only-child and far-spacing groups versus near-spacing group, and (3) only-child group versus the mean of combined near- and far-spacing groups. These same contrasts are multiplied by socioeconomic status to define interaction differences or effects between working- and middle-class groups for these cases. Each pair of resulting contrasts in slopes were then tested separately for significance.

In order to establish the magnitude of the relationship between social class, family configuration, parental communication strategy variables and child assessment variables, the control variables (social class, configuration, and social class-configuration interaction terms) and the explanatory variables (parental communication belief variables) were entered in a stepwise fashion and multiple correlations were produced for each step. This procedure was followed for each of the 16 selected dependent (child assessment) variables. Results of these analyses are reported in Table 8.

The multiple correlations presented in Table 8 indicate that children's performance on one variable, i.e., higher level (relational) definitions of friendship, was not significantly related to any of the control (covariate) or the explanatory (parent communication belief) variables. Hence, this variable will be excluded from subsequent analyses. Children's levels of performance varied with the control variables but the parental belief variables did not add sufficient information to more accurately account for

Table 8

The Relationship Between Socioeconomic Status, Family Configuration, Parental Communication Strategy, Belief Variables, and Selected Child Assessment Variables

Control and Explanatory Variables	Dependent Variables	F	t	p	R
	Time to Reconstruct Array (SRI)				
Social Class		5.07		<.03	.20
Family Configuration		4.90		<.01	.34
Interaction Terms		1.18		<.31	.36
	Recognition (SRI)				
Social Class		.71		<.40	.08
Family Configuration		2.21		<.11	.21
Interaction Terms		3.95		<.02	.32
Diversion Strategy PII (mothers)			-2.09	<.05	.37
Distancing Strategy Preference (fathers)			2.04	<.05	.41
Number of Childrearing Goals (mothers)			2.02	<.05	.44
	Correct Sequence Pairs Reconstructed (SRI)				
Social Class		2.57		<.11	.15
Family Configuration		1.30		<.28	.21
Interaction Terms		.84		<.43	.24
Assessment as a Childrearing Goal (mothers)			2.66	<.05	.30
Child Constraints (fathers)			-2.76	<.05	.36
Parent (self) Childrearing Orientation (fathers)			2.39	<.05	.41
	Correct Items Reconstructed (SRI)				
Social Class		.00		<.95	.01
Family Configuration		1.00		<.37	.13
Interaction Terms		.02		<.98	.13
Assessment as a Childrearing Goal (mothers)			2.91	<.05	.24
Child Constraints (fathers)			-2.55	<.05	.30
Parent (self) Childrearing Orientation (fathers)			2.54	<.05	.38
	Reconstruct Array in Vertical Dimension				
Social Class		.43		<.51	.06
Family Configuration		.75		<.47	.13
Interaction Terms		.75		<.48	.17

Table 8 (Cont.)

Control and Explanatory Variables	Dependent Variables	F	t	p	R
	Reconstruct Array in Vertical Dimension (Contd.)				
Number of Childrearing Goals Associated with PII Strategies (fathers)			3.06	<.05	.26
Parent-Role Childrearing Orientation (mothers)			3.83	<.05	.32
Parent-Role Childrearing Orientation (fathers)			-3.21	<.05	.42
Other (nonfamily member) Childrearing Orientation (fathers)			-2.15	<.05	.46
Passive Strategy PII (mothers)			2.02	<.05	.49
	Prediction of Transformation				
Social Class		1.56		<.21	.11
Family Configuration		1.86		<.16	.21
Interaction Terms		3.42		<.04	.31
	Maintenance of Anchor Point (KAI)				
Social Class		7.93		<.01	.25
Family Configuration		1.67		<.19	.30
Interaction Terms		.71		<.49	.32
	Anticipation of Rotation (KAI)				
Social Class		1.78		<.19	.12
Family Configuration		.81		<.45	.17
Interaction Terms		1.82		<.17	.24
Number of Childrearing Goals Associated with PII Strategies (fathers)			-2.80	<.05	.35
	Logical Classification Groupings				
Social Class		3.90		<.05	.18
Family Configuration		.94		<.39	.22
Interaction Terms		.06		<.94	.22
Child Constraints (fathers)			-3.31	<.05	.36
	Groupings Based on Descriptive Characteristics				
Social Class		4.66		<.03	.19
Family Configuration		2.39		<.10	.27
Interaction Terms		1.00		<.37	.30
Child Constraints (fathers)			-2.56	<.05	.38
	Groupings Based on Logical Classes				
Social Class		.02		<.90	.01
Family Configuration		.75		<.47	.11
Interaction Terms		.96		<.39	.17

Table 8 (Cont.)

Control and Explanatory Variables / Dependent Variables	F	t	p	R
Groupings Based on Logical Classes (Cont.)				
Passive Strategy PII (mothers)		2.18	<.05	.26
Passive Interpersonal Strategies				
Social Class	.49		<.48	.06
Family Configuration	3.23		<.04	.24
Interaction Terms	1.39		<.25	.28
Number of Childrearing Goals (mothers)		2.96	<.05	.42
Parent (self) Childrearing Orientation (mothers)		-2.74	<.05	.46
Assessment as a Childrearing Goal (fathers)		-2.28	<.05	.50
Higher Level (Logical) Rationales for Rules and Conventions				
Social Class	15.22		<.01	.34
Family Configuration	.02		<.98	.34
Interaction Terms	1.60		<.21	.37
Distancing Strategy Preference (fathers)		-3.46	<.05	.43
Parent (self) Childrearing Orientation (fathers)		-2.90	<.05	.48
Child Constraints (fathers)		-2.63	<.05	.54
Other (nonfamily member) Childrearing Orientation (mothers)		3.04	<.05	.56
Number of Childrearing Goals Associated with PII Strategies (fathers)		2.43	<.05	.57
Diversion Strategy PII (mothers)		-2.00	<.05	.59
Knowledge of Rules and Conventions				
Social Class	10.59		<.01	.29
Family Configurations	.03		<.97	.29
Interaction Terms	.82		<.44	.31
Distancing Strategy Preference (fathers)		-4.25	<.05	.46
Authoritarian Strategy Preference (mothers)		-2.86	<.05	.51
Parent (self) Childrearing Orientation (mothers)		-2.24	<.05	.54
Lower Level Definitions of Friendship				
Social Class	.26		<.61	.05
Family Configurations	1.76		<.18	.18
Interaction Terms	.06		<.94	.18
Authoritarian Strategy Preference (fathers)		2.81	<.05	.30
Other (nonfamily member) Childrearing Orientation (mothers)		-2.30	<.05	.37

Table 8 (Cont.)

Control and Explanatory Variables	Dependent Variables	F	t	p	R
	Higher Level (Relational) Definitions of Friendship				
Social Class		2.97		<.09	.16
Family Configurations		.33		<.72	.17
Interaction Terms		.88		<.42	.21

differences for three of the remaining 15 dependent variables. These variables were (1) Time used to reconstruct an array from memory, (2) Numbers of correct predictions of transformations on the conservation task, and (3) maintenance of anchor points on a rotation (kinetic anticipatory imagery) task. For the first variable above, effects for socioeconomic status and for family configuration were obtained. Interaction of the covariates explained a small but significant portion of the variance in number of correct conservation predictions, with no significant contribution of parental communication beliefs. Performance on the third variable listed above, anchor point maintenance, was correlated significantly with socioeconomic status. The mean (and standard deviations) performance levels on each of these variables were reported in Table 5 for social class and family configuration groups.

To summarize the findings thus far, performance on three of the dependent variables was related to the covariates of social class, family configuration and the interaction between them and parental communication beliefs did not contribute a significant amount of explained variance over and above these control variables. The remaining 12 dependent variables were significantly correlated with parental belief variables. These 12 variables will be presented below.

Six dependent variables were correlated with the covariate and with one or more of the independent variables (parental communication belief variables) that were subsequently included in the overall equation. These variables were: (1) recognition of an array (SRI), (2) number of logical groupings (Categorization), (3) groupings based on surface characteristics (Categorization), (4) knowledge of rules and conventions, (5) logical rationales for rules and conventions,

and (6) passive interpersonal problem-solving strategies. Each of these will be discussed separately.

(1) Recognition: The interaction terms based on social class and family configuration were the first variables entered that correlated with the recognition score. Three parent belief variables that were entered subsequently did serve as explanatory variables that accounted for significant amounts of variance. Fathers' preferences for distancing strategies and the number of childrearing goals expressed by mothers were positively related to children's recognition scores. Diversion as a follow-up strategy (P II) by mothers was negatively related to recognition scores. Distancing strategies and number of goals can be interpreted as variables related to placing demands on the child to achieve certain levels of performance. Diversion strategies do not place such demands and in fact may tend to placate the child when a problem does arrive. Thus, it appears that parental focus on fulfilling the potential development of the child is related to children's recognitory memory skills.

(2) Formation of logical groupings and (3) Basing groupings on descriptive characteristics: The same pattern of prediction was obtained for these dependent variables from the Categorization task. The covariate of socioeconomic status correlated significantly with the dependent variables of number of logical grouping responses and of number of groupings that were based on descriptive characteristics such as objects' form, color, etc. In addition to social class, fathers' references to child constraints were negatively related to both grouping responses and descriptive basis for grouping objects. That is, children of fathers who did not refer to limitations on the child's capabilities performed at higher levels in

forming consistent groupings and at intermediate levels in selection of the basis for those groupings.

(4) Knowledge of rules and conventions: Socioeconomic status correlated significantly with children's knowledge of rules and conventions. Three independent variables correlated negatively with children's rules and conventions score: (a) Father's preferences for distancing strategies, (b) Mother's preferences for authoritarian strategies, and (c) Maternal child-rearing orientations that focused on parent. These parental belief variables share the characteristic that explanations are not given to the child. Thus, children who evidence lesser knowledge of rules and conventions had parents who did not focus on providing explanations or rationales to the child.

(5) Logical rationales for rules and conventions: Socioeconomic status was also related to children's ability to provide higher level (logically based) rationales for rules and conventions. Seven parent belief variables also accounted for significant portions of the variance in children's responses. Positively related to child outcomes were (a) number of goals fathers hoped to attain with secondary follow-up strategies, and (b) mothers' childrearing orientation focusing on others (nonfamily members). Significant relationships in a negative direction were obtained for (a) fathers' preferences for distancing strategies, (b) childrearing orientation directed toward parents (self) by fathers, (c) fathers' references to child constraints, (d) mothers' predictions of diversion strategies as secondary follow-up tactics with the child. This group of variables represents belief in a directive approach toward socializing the child, and such beliefs might tend to foster the child's understanding of societal rules.

(6) Passive interpersonal problem-solving strategies: Family configuration correlated significantly with this dependent variable. The number

of childrearing goals expressed by mothers was positively related to children's use of passive strategies. Maternal childrearing orientation directed at parents (self) and fathers' goals of assessing the child's inner state were negatively related to this child variable. The parent characteristics can be viewed as a concern with surface accomplishments. That is, mothers who have many goals for the child and who do not reflect a self orientation tended to have children who generated passive interpersonal strategies. In addition, fathers of these children did not evidence goals of finding out about the child's inner state. These parents appear to be concerned with achievements of the child and not with internal aspects of the child or with themselves.

Six dependent variables were not significantly related to the covariates but were explained by some of the independent parental belief variables. These were (1) number of correct sequence pairs in a reconstructive memory task (SRI), (2) number of correct items in a reconstructive memory task (SRI), (3) constructions of vertical array instead of reconstructed horizontal array (SRI), (4) groupings based on logical classes (Categorization), (5) maintenance of anchor point (KAI), and (6) lower level (nonrelational) definitions of friendship.

The first two variables, (1) correct sequence pairs, and (2) number of correct items are not independent and similar results were obtained from the covariate analyses computed on each variable. Correlations of the control variables with the dependent variables were small and nonsignificant. The independent variables of maternal goals of assessing the child and paternal childrearing orientation directed towards parents were related to children's success on the reconstructive memory taks in a positive direction, while

fathers' references to constraints on the child were negatively related to these dependent variables. This relationship indicates that maternal concern with the child's inner state, paternal beliefs in the child's capabilities and fathers' self orientations predict the level of the child's reconstructive memory to a significant degree.

(3) The dependent variable defined as construction of vertical arrays refers to children's tendency to incorrectly reconstruct the row of blocks used in the memory (SRI) task as a tower. Three parent belief variables correlated positively with tower building and two produced significant negative correlations. Number of childrearing goals fathers associate with secondary (P II) strategies, parent-role orientation by mothers and passive secondary (P II) strategies by mothers were positively related to tower building. Fathers' childrearing orientations that are parent-role directed and other (nonfamily members) directed were negatively related to tower building. The relationship between these independent and dependent variables must be considered with the fact that tower building is a lower level, less sophisticated response to the task. Thus, it appears that secondary follow-up tactics are important in relation to such responses and fathers with parent-role orientation or orientation towards others tend to have children who perform better on this task.

(4) Groupings based on logical classes: Maternal secondary tactics (P II) that are passive strategies (e.g., nonintervention, nonacceptance of situation, concession to child) were positively related to children's explanations of groupings in terms of logical class relationships and labels. This suggests that parents who believe that the problem should be ignored if the first strategy fails had children who had developed higher level classification abilities.

(5) Maintenance of anchor points: The number of childrearing goals expressed by fathers in association with secondary follow-up communication strategies was negatively related to children's ability to maintain anchor points in space while anticipating rotation of objects about that anchor. That is, fathers who hope to accomplish fewer goals after their first strategy failed tended to have children who correctly maintained anchor points in an anticipatory spatial task.

(6) Lower level definitions of friendship were not based on attributes of the other person or on relationships between people. Two parental belief variables correlated with frequency of lower level definitions given by children. Fathers' preferences for authoritarian strategies were related in a positive direction and maternal childrearing orientations directed towards other (nonfamily members) were related in a negative direction. That is, children who gave lower level definitions of friendship had fathers who believed in authoritarian methods and mothers who did not focus on non-family members in her childrearing orientation.

Parent-Child Observations

Parental behaviors observed during parent-child interactions were first analyzed in terms of two broad categories of behavior--evaluative feedback and distancing strategies. Systems for providing evaluative and informational feedback to the child (e.g., disapproval, approval with task facilitation, etc.) used by a subset of middle class families who performed the storytelling task were examined as part of a thesis completed at the University of Wisconsin (Bell, 1979). The results of these analyses will be summarized below and results pertaining to distancing strategies will be presented in the subsequent section.

Evaluative and informational feedback: Analyses of variance, including parent sex, child sex, and family constellation were performed on evaluative and informational feedback behaviors (see coding manual), using parental income and education as covariates. The effects of parental income were controlled in all analyses except one in which parent age was the only covariate, and the effects of income together with the effects of education were controlled in the analyses of approval with task facilitation, disapproval with task facilitation and helping. Covariate analyses were indicated by significant correlations between income, education, age and the specified response measures.

When disapproval with task facilitation was analyzed, a main effect for parent gender was found when holding parental education and income constant ($F(1,85) = 5.92$, $p < .02$). Across groups, fathers gave more disapproval with task facilitation than mothers ($\bar{X}_F = 3.7$, $\bar{X}_M = 2.1$).

Analysis of the amount of approval with task facilitation given by parents yielded a significant two-way interaction effect of child gender and family type ($F(2,85) = 5.08$, $p < .009$). The greatest difference between the amounts of parental task-facilitative approval given to boys and girls were in far-spaced three-child families where girls received substantially more than boys. The least discrepancy between boys and girls on this measure was found in near-spaced families.

A second interaction effect of child gender and family type was found on total task-facilitative feedback ($F(2,85) = 4.53$, $p < .02$) with parental income as a covariate. Girls in three-child families received more facilitative feedback than boys, with a much greater discrepancy in far-spaced than close-spaced families. In one-child families, boys received more task-facilitative feedback than girls.

A significant two-way interaction effect of parent gender and family type on total number of interactions between parent and child ($F(2,85) = 3.14$, $p < .05$) was found when controlling for parent age. Mothers and fathers interacted with their only children in approximately the same amounts. Mothers and fathers of three-child families, however, interacted with their preschoolers very differently, with father providing substantially more interaction in the paper-folding task than mothers.

When parental income and education were controlled, a significant three-way interaction effect was found on parental task-facilitative disapproval ($F(2,85) = 3.65$, $p < .03$). In terms of the mean amounts of disapproval with task facilitation exhibited, mothers in all three family types discriminated less on the basis of child gender than

did fathers. Fathers of only sons gave the highest amounts of task-facilitative disapproval of any parent group and mothers of only sons gave the lowest amounts.

A three-way interaction among parent gender, child gender and family type was found in relation to parental helping behavior ($F(2,85) = 3.08$, $p < .05$) when parental income and education were controlled. Father-daughter dyads in near-spaced families and mother-son dyads in far-spaced families accounted for the highest amounts of helping exhibited during the paper-folding task. Lowest amounts were given by fathers of daughters in far-spaced families and mother of only sons.

A third three-way interaction effect was found on total parental approval, adjusting for income ($F(2,85) = 3.11$, $p < .05$). On mean amounts of total approval exhibited, mothers in all three family types showed little difference in behavior toward boys and girls. Fathers, on the other hand, provided highly discrepant amounts of approval for boys and girls. Fathers of only sons gave nearly double the amount of total approval given by fathers of only daughters. For fathers in three-child families, this pattern was reversed. Middle daughters received substantially more approval from their fathers than did middle sons. Five parent subgroups provided relatively high amounts of total approval for their children. They were fathers of only sons, fathers of near-spaced and far-spaced daughters, and mothers of only sons and daughters.

In summary, parent gender, sex of the child, and family configuration do seem to relate to the manner in which parents use specific types of evaluative feedback when interacting with their child. These results can be summarized as follows: (1) Fathers of sons and fathers of

daughters exhibit discrepant amounts of evaluative feedback while mothers of sons and mothers of daughters relate similarly to their children. (2) Parents of only sons and parents of middle (second-born) daughters with older sisters provide more task-oriented feedback (both positive and negative) for those children than parents of only daughters or parents of middle sons with older brothers, especially when the three-child families have far sibling spacing. (3) Only children receive approximately equal amounts of interation from parents while middle children from three-child families receive larger amounts of interaction from fathers than mothers in the laboratory setting. These data reinforce the previously suggested need to integrate child development theory with family and social relations theory. The results indicate the importance of considering the family context in attempting to understand parent-child interaction.

Conclusions

A basic premise underlying this research is that parental practices stem from beliefs that have been constructed on the basis of experience with children within the context of the family environment. Further, the education-income level of the parents and the number and spacing of children serve to generate differences in beliefs that are translated into differential childrearing practices that ultimately impact the cognitive development of the child. The analyses presented in this report represent initial efforts directed toward testing such a model of parent-child influence.

Results obtained from analysis of the child assessment clearly implicate social class and family configuration factors in the development of children's problem-solving abilities. Three family configuration groups and six groups formed on the basis of social class and family constellation were differentiated from one another on the basis of a subset of child assessment variables used in the two discriminant analyses. Inspection of univariate F's and means for each group indicate that children from one particular family constellation are not at an advantage in all areas. That is, children from different family configurations demonstrate different strengths and weaknesses relative to other children, depending on the problem in question. At times, the results obtained violate common stereotypes associated with family characteristics. For example, results of one discriminant analysis indicated that only children differed from children with siblings on a function that was largely due to frequencies of passive strategies (e.g., wait, withdraw from interaction, concession, substitute goal, ignore, etc.) used in the interpersonal problem-solving task (see Table 3). Based on stereotypes of the lonely, socially-deprived only child, one might assume that only children evidenced higher frequencies for this type of passive social response than other children. In fact, only children

tended to generate passive strategies less often than children with siblings (see Table 5). The analysis of covariance confirmed the finding that family configuration was related to children's use of passive interpersonal problem-solving strategies and contrast tests indicated that indeed the mean for only children differed significantly from that for children with near sibling spacing, for children with far sibling spacing and for these multiple-child family groups combined (see Table 8). Additional explanatory evidence was obtained from this analysis in that several parental belief variables also provided significant amounts of explanatory power. These variables suggest that parental concern with child achievement and not with inner states and capabilities of the child was related to children's use of passive strategies. Thus, we can lay one stereotype of the only child to rest, and focus on family process variables that may be responsible for child outcomes that do differ with family structure differences.

Significant relationships obtained between parental communication beliefs variables and children's problem-solving scores lend credence to the theoretical model and the premises underlying the design of this study. To date, measures representing the various constructs of parental beliefs, parental practices and child outcomes have not been integrated into one analysis that investigates the interrelationships of these constructs and that simultaneously incorporates social class and family configuration factors. Specifically, the observational data providing an index of parental childrearing practices has not yet been analyzed in relation to parental belief and child problem-solving variables. After this has been accomplished, the model of the family as a system of mutual influences can be fully tested.

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